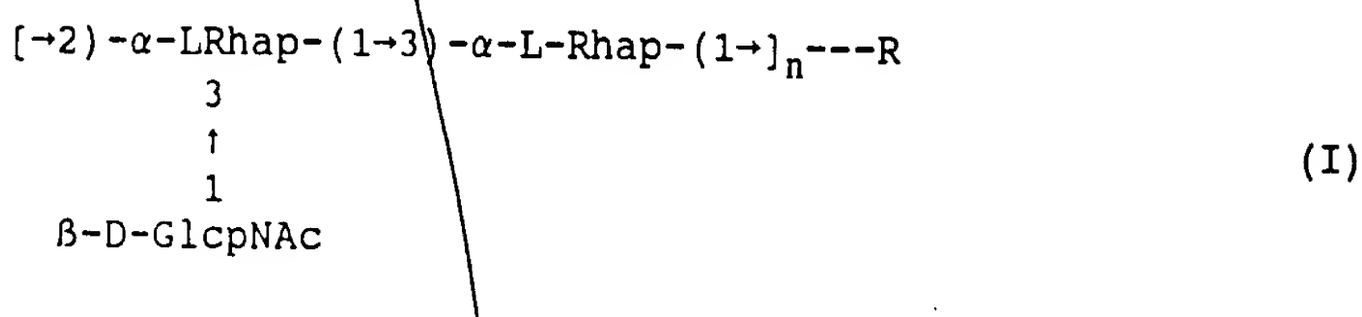
WE CLAIM:

1. An immunogenic composition comprising an immunogenic amount of group A polysaccharide of formula (I)



(I)

wherein R is a terminal reducing L-rhamnose or D-GlcpNAc; wherein n is a number sufficient to make the immunogenic composition large enough and of a sufficient average molecular weight to be immunogenic, and a carrier, wherein said composition provides protection in mammals against infection by group A Streptococcal bacteria.

2. The immunogenic composition according to claim 1 wherein n is from about 1 to about 50.

3. The immunogenic composition according to claim 2 wherein the group A polysaccharide has a molecular weight of about 10,000 Kd.

4. The immunogenic composition according to claim 1 wherein said immunogenic composition is administered to an individual in a dosage amount of about 0.01 μg to about 10 μg per kilogram of body weight.

5. The immunogenic composition according to claim 1 wherein the carrier is selected from the group consisting of saline, Ringer's solution, and phosphate buffered saline.

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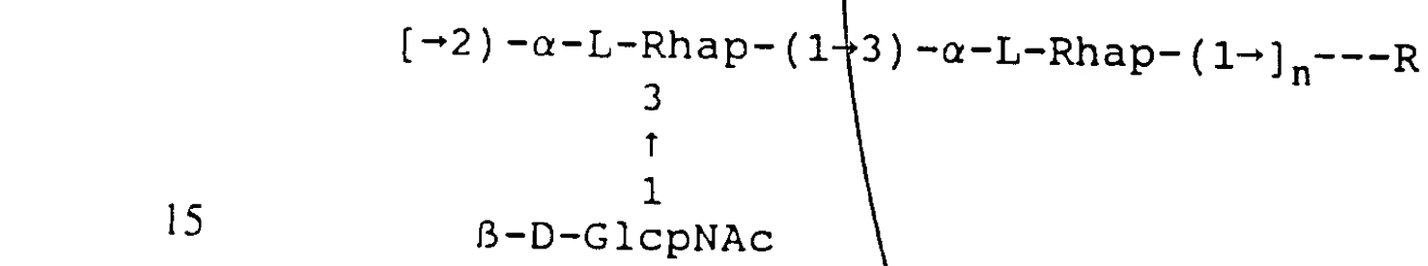
6. The immunogenic composition according to claim 5 wherein the immunogenic composition further comprises an adjuvant.

7. The immunogenic composition according to claim 6 wherein the adjuvant is selected from the group consisting of aluminum hydroxide, aluminum phosphate, monophosphoryl lipid A, QS21 and stearyl tyrosine.

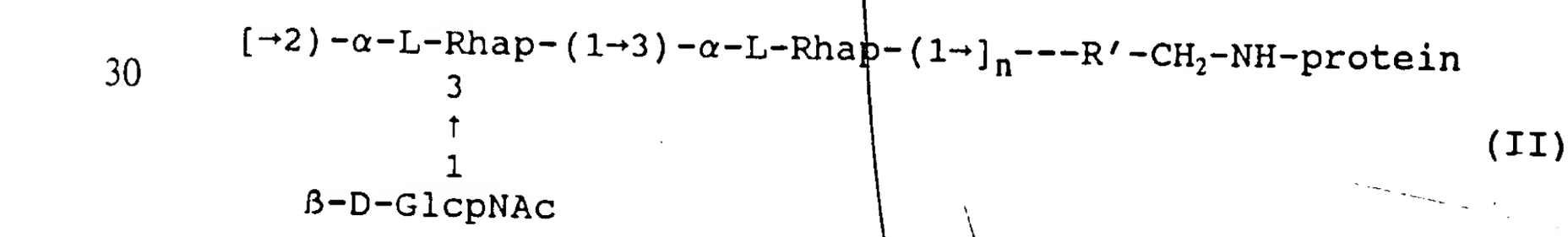
8. An immunogenic polysaccharide-protein conjugate molecule comprising a group A polysaccharide of formula (I)



(I)

wherein R is a terminal reducing L-rhamnose or D-GlcpNAc, and n is a number sufficiently large to provide an immunogenic response to the ß-D-GlcpNAc residue glycosidically linked to position 3 of rhamnose as shown in formula (I) and which defines an epitope which induces the formation of bactericidal antibodies, and wherein the polysaccharide is covalently linked to protein.

9. The immunogenic polysaccharide-protein conjugate according to claim 8 wherein the polysaccharide is linked to protein through a secondary amine bond to form a conjugate of formula (II)



(II)

wherein R′ is the product of reduction and oxi

the terminal reducing sugar which is not represented in the $-CH_2-NH-$protein secondary amine bond of formula II.

10. The immunogenic polysaccharide-protein conjugate according to claim 9 wherein the protein is any native or recombinant bacterial protein.

11. The immunogenic polysaccharide protein conjugate according to claim 10 wherein the protein is selected from the group consisting of tetanus toxoid, cholera toxin, diphtheria toxoid or CRM_{197}.

12. The immunogenic polysaccharide-protein conjugate according to claim 11 wherein the protein is tetanus toxoid.

13. The immunogenic polysaccharide-protein conjugate according to claim 12 wherein n is about 1 to about 50.

14. The immunogenic polysaccharide-protein conjugate according to claim 13 wherein n is from about 3 to about 30.

15. The immunogenic polysaccharide-protein conjugate according to claim 14 wherein the polysaccharide has a molecular weight of about 10,000 kd.

16. The protein-polysaccharide conjugate according to claim 8 wherein the protein of the conjugate comprises a T-cell epitope and is at least of a length of about 10 amino acids.

17. A vaccine for providing protection against infection by group A Streptococcus comprising an immunogenic amount of group A polysaccharide of formula

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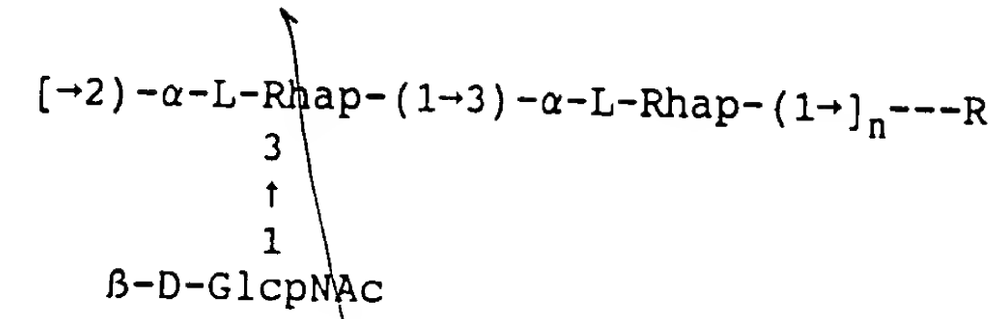
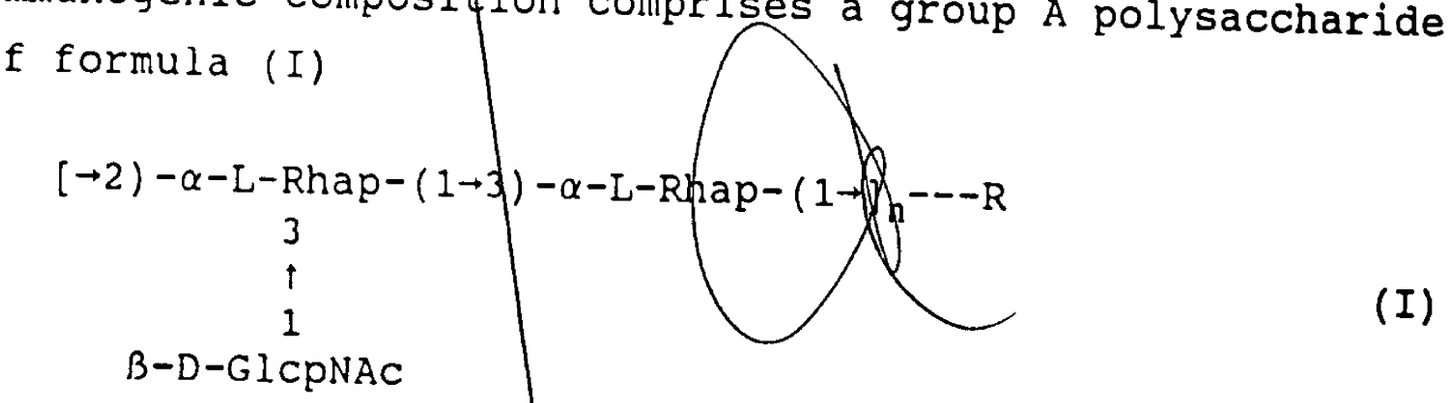
(I)



(I)

wherein R is a terminal reducing L-Rhamnose or D-GlcpNac, and n is a number sufficiently large to provide an immunogenic response to the ß-D-GlcpNAc residue glycosidically linked to position 3 of rhamnose as shown in formula (I) and which defines an epitope which induces the formation of bactericidal antibodies, and a carrier, wherein said composition provides protection in mammals against infection by group A Streptococcal bacteria.

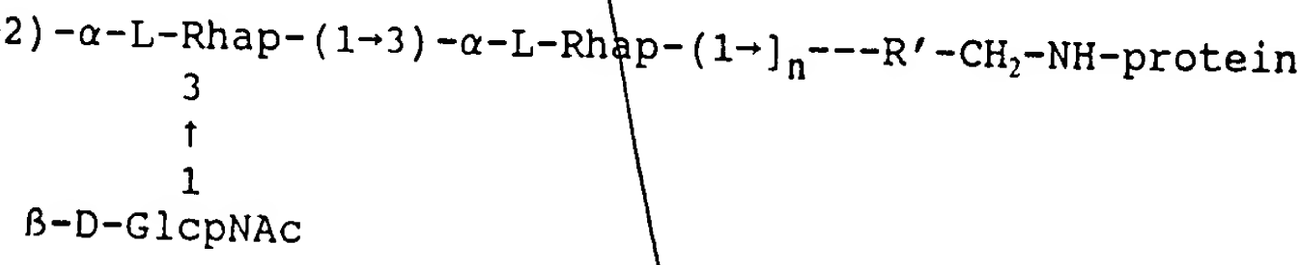
18. The vaccine according to claim 17 wherein the immunogenic composition comprises a group A polysaccharide of formula (I)



(I)

wherein R is a terminal reducing L-Rhamnose or D-GlcpNAc, and n is a number from 1 to 50, and wherein the polysaccharide is covalently linked to protein.

19. The vaccine according to claim 18 wherein the polysaccharide is linked to protein through a secondary amine bond to form a conjugate of formula (II)



(II)

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wherein R' is the product of reduction and oxidation of the terminal reducing sugar which is not represented in the $-CH_2-NH-$protein secondary amine bond of formula II.

20. The vaccine according to claim 19 wherein the protein is any native or recombinant bacterial protein.

21. The vaccine according to claim 20 wherein the protein is selected from the group consisting of tetanus toxoid, cholera toxin, diphtheria toxoid, and CRM_{197}.

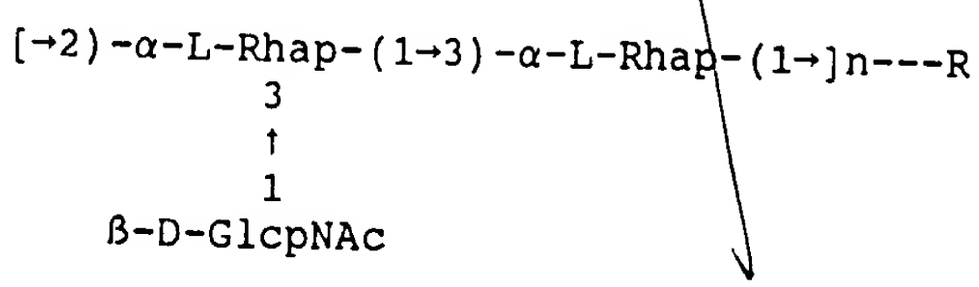
22. The vaccine according to claim 12 wherein the protein of the polysaccharide-protein conjugate is tetanus toxoid.

23. The vaccine according to claim 22 wherein n of the polysaccharide-protein conjugate is from about 3 to about 30.

24. The vaccine according to claim 23 wherein the polysaccharide in the conjugate the vaccine has a molecular weight of about 10,000 Kd.

25. The vaccine according to claim 24 wherein the vaccine is administered to an individual in a dosage amount of about 0.01 μg to about 10 μg per kilogram of body weight.

26. A method of immunizing a mammal against infection by group A Streptococcal bacteria comprising administering to an individual an immunogenic amount of the polysaccharide of formula (I)



(I)

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wherein R is a terminal reducing L-rhamnose or D-GlcpNAc; and n is a number sufficient to make the group A polysaccharide large enough and of an average molecular weight to be immunogenic.

27. The method according to claim 26 wherein n is from about 1 to about 50.

28. The method according to claim 27 wherein n is from about 3 to about 30.

29. The method of immunizing according to claim 28 wherein the group A polysaccharide has a molecular weight of about 10,000 Kd.

30. The method of immunizing according to claim 29 wherein the group A polysaccharide is administered in a dosage amount of about 0.10 μg to about 10 μg per kilogram of body weight.

31. The method of immunizing according to claim 30 wherein polysaccharide is administered with a carrier selected from the group consisting of saline, Ringer's solution and phosphate buffered saline.

32. The method of immunizing according to claim 31 wherein the polysaccharide further comprises an adjuvant.

33. The method of immunizing according to claim 32 wherein the adjuvant is selected from the group consisting of aluminum hydroxide, aluminum phosphate, monophosphoryl lipid A, QS21 and stearyl tyrosine.

34. The method of immunizing according to claim 26 wherein the mammal is human.

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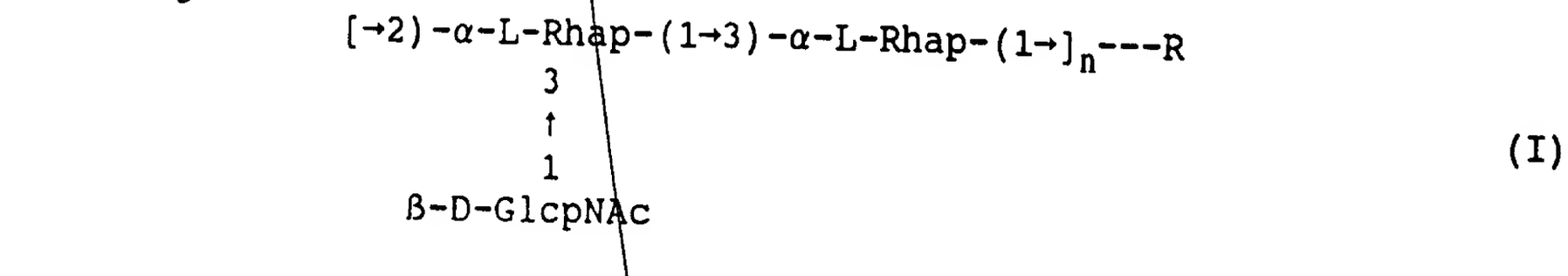
35. The method of immunizing according to claim 34 wherein the human is a child.

36. An immunogenic conjugate molecule comprising a group A polysaccharide of formula (I)



(I)

wherein R is a terminal reducing L-rhamnose or D-GlcpNAc, and n is a number sufficiently large to provide an immunogenic response to the ß-D-GlcpNAc residue glycosidically linked to position 3 of rhamnose as shown in formula (I) and which defines an epitope which induces the formation of bactericidal antibodies, covalently linked to liposomes to form the conjugate molecules.

37. The polysaccharide-liposome conjugate of claim 36 wherein the liposomes are constructed of cationic lipids.

38. The polysaccharide-liposome conjugate of claim 37 wherein the liposomes are comprised of phosphatidylethanolamine.

39. The polysaccharide-liposome conjugate of claim 38 wherein the group A polysaccharide has a molecular weight of about 10,000 Kd.

40. The polysaccharide-liposome conjugate of claim 39 wherein said immunogenic complex is administered to an individual in a dosage amount of about 0.01 μg to about 10 μg per kilogram of body weight.

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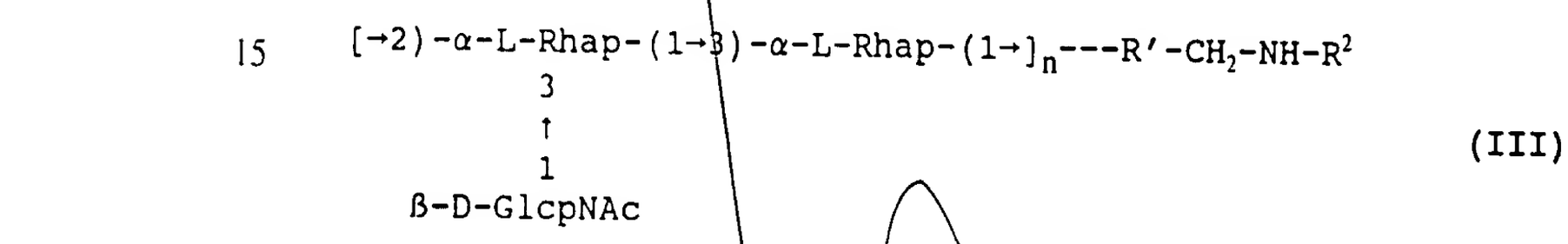
41. The conjugate according to claim 36 wherein the polysaccharide-liposome conjugate further comprises protein embedded in said liposome.

42. A method of immunizing against infection by group A Streptococcal bacteria by administering an immunogenic amount of the composition according to claim 37.

43. The method of immunizing according to claim 42 wherein the liposome is compromised of phosphatidylethanolamine and the polysaccharide is liked to phosphatidylethanolamine through a secondary amine bond to from a conjugate of formula III



(III)

wherein R′ is the product of reduction and oxidation of the terminal reducing sugar except for the portion of the terminal reducing sugar bound to the NH group of the secondary amine bond of formula III, and R^2 is phosphatidylethanolamine.

44. The method of immunizing according to claim 43 wherein n is from about 1 about 50.

45. The method of immunizing according to claim 44 wherein the polysaccharide has a molecular weight of about 10,000 Kd.

46. The method of immunizing according to claim 45 wherein the polysaccharide-liposome conjugate is administered to an individual in a dosage amount of about 0.01 μg to about 10 μg per kilogram of body weight.

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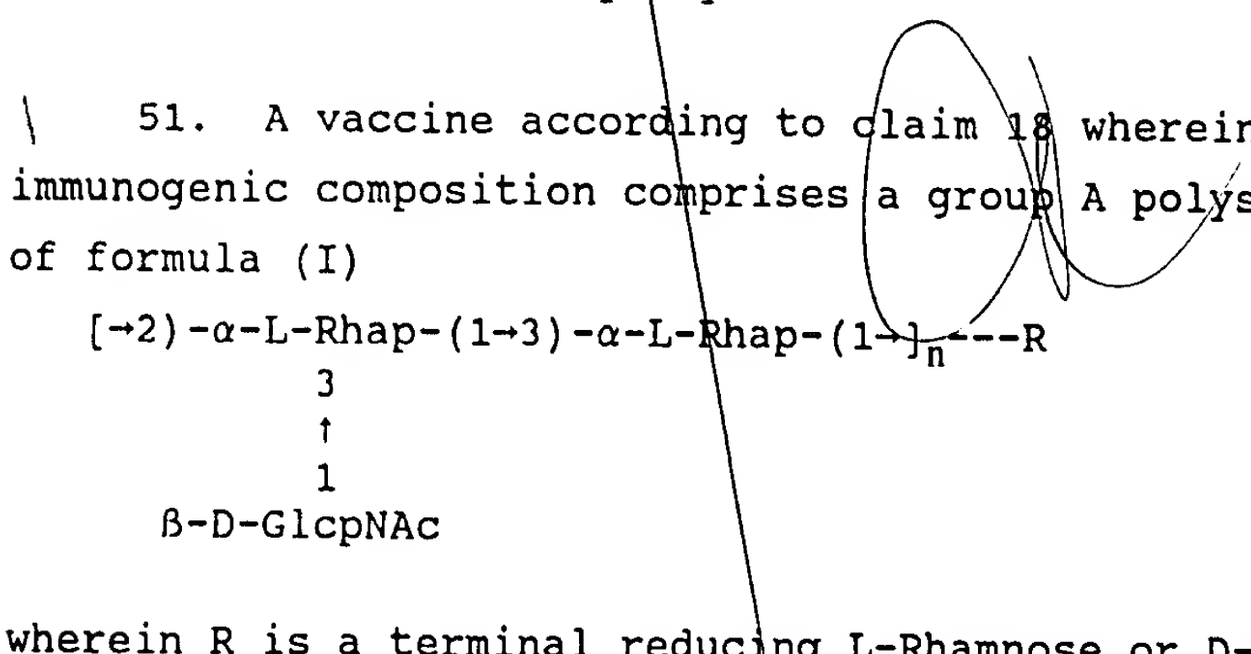
47. The method of immunizing according to claim 46 wherein the polysaccharide-liposome conjugate is administered with a carrier selected from the group consisting of saline, Ringer's Solution and phosphate buffered saline.

48. The method of immunizing according to claim 46 wherein the polysaccharide-liposome composition further comprises an adjuvant.

49. The method of immunizing according to claim 48 wherein the adjuvant is selected from the group consisting of aluminum hydroxide, aluminum phosphate, monophosphoryl lipid A, QS21 and stearyl tyrosine.

50. The method of immunizing according to claim 49 wherein the adjuvant is selected from the group consisting of aluminum hydroxide, aluminum phosphate, monophosphoryl lipid A, QS21 and stearyl tyrosine.

51. A vaccine according to claim 18 wherein the immunogenic composition comprises a group A polysaccharide of formula (I)



(I)

wherein R is a terminal reducing L-Rhamnose or D-GlcpNAc and n is a number sufficiently large to provide an immunogenic response to the ß-D-GlcpNAc residue glycosidically linked to position 3 of rhamnose as shown in formula (I) and which defines an epitope which induces the formation of bactericidal antibodies, and wherein the polysaccharide is covalently linked to liposomes.

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52. The vaccine according to claim 51 further comprising native or recombinant bacterial protein embedded in the liposomes.

53. The vaccine according to claim 52 wherein the bacterial protein is tetanus toxoid.

54. The vaccine according to claim 53 wherein n of the polysaccharide-liposome composition is between about 1 and 50.

55. The vaccine according to claim 54 wherein the polysaccharide-liposome composition of the vaccine has a molecular weight of about 10,000 Kd.

56. The vaccine according to claim 55 wherein the vaccine is administered to an individual in a dosage amount of about 0.01 μg to about 10 μg per kilogram of body weight.

57. An immune composition for conferring passive immunity comprising bactericidal antibodies from group A Streptococcal bacteria wherein said antibodies are produced by immunizing an individual with any of the immunogenic compositions of any one of claims 1, 8, 37, and 42.

58. The immune composition according to claim 57 wherein the bactericidal antibodies are present in serum, a gamma globulin fraction or a purified antibody preparation.

59. A method of conferring passive immunity to an individual an immunogenic amount of the immune composition according to claim 57.

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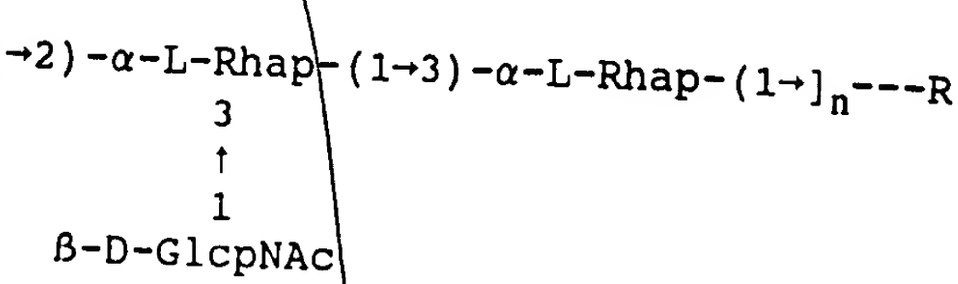
60. A method of covalently linking group A polysaccharide of formula I



wherein R is a terminal reducing L-rhamnose or D-GlcpNAc, and n is a number of repeat units sufficiently large to define a polysaccharide of sufficient average molecular weight to be immunogenic, and a liposome comprising phosphatidylethanolamine comprising:

a) forming liposome of phosphatidylethanolamine;

b) activating group A polysaccharide by reducing the terminal sugar and oxidizing the reduced sugar to form a terminal aldehyde;

c) combining the activated group A polysaccharide and the liposomes and covalently linking the group A polysaccharide to the liposome by reductive amination to form a group A polysaccharide-liposome conjugate; and

d) recovering the group A polysaccharide - liposome conjugate.

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